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# Studies on Coal Sulfur : Behaviour of Coal Sulfur in Carbonisation of Anthracite

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CITATION:

Funasaka, Wataru ...[et al]. Studies on Coal Sulfur : Behaviour of Coal Sulfur in Carbonisation of Anthracite. Bulletin of the Institute for Chemical Research, Kyoto University 1953, 31(3): 230-231

ISSUE DATE:

1953-05-30

URL:

<http://hdl.handle.net/2433/75312>

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the crusher must be cooled to avoid the ununiformity of aging.

The general idea of the mechanism of crushing of alkali cellulose has been that the alkali cellulose is crushed by the grinding between the opposite discs.

According to the authors' research, the slit which is formed by outside edges of the fixed part and the rotating plate is definitely conducted to the shredding of alkali cellulose.



Based on the above idea, the continuous shredder was designed (see photo).

The state of crushed alkali cellulose is superior to other crushers, thus the above noted defects have completely been dissolved.

## 22. Studies on Coal Sulfur

### Behaviour of Coal Sulfur in Carbonisation of Anthracite

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It is little known about the distribution of sulfur in carbonisation products in case of coal carbonisation, and the results are uncertain. This fact is presumably attributed to the difference of the apparatus and condition for carbonising coal, as well as the rank of coal samples and forms of sulfur compounds in coal *etc.*

We carried out the carbonisation of anthracite under certain carbonising conditions and determined the sulfur balance for the carbonisation products.

**Experiments.** For the carbonisation experiments, we employed the Kings-Gray's apparatus with the apparatus to determine the sulfur in gas.

The coal sample was Kishu-anthracite, and its analytical data were as follows:  
Moisture 5.04 %, Ash 19.57 %, Volatile matter 8.89 %, Fixed carbon 66.41 %;

Total Sulfur 2.44 %, Sulfate Sulfur 0.57 %, Pyrite Sulfur 0.20 %, Organic Sulfur 1.67 %.

The carbonisation experiments were carried out at every 100° from 400° to 1000°C. The coal samples were carbonised with heating rate 5°C /min. and 3°C /min., and maintained for *ca.* 1 hr. at fixed temperature. The determination of sulfur content was as follows:

Inorganic sulfur in gas ( $H_2S$ ) was precipitated as  $CdS$ , and then determined by

iodimetry. The lamp-method was used to determine the organic sulfur in gas. About the sulfur content of coal sample and cokes, total sulfur was determined by Eschka's method, and, as to pyrrhotite sulfur, coke was boiled with 1 : 1 HCl for 15 mins., and evolved  $H_2S$  was determined as described above. Sulfate and pyrite sulfur were extracted from the coal and cokes with 3 % HCl, at 60°C for 40 hrs., and  $HNO_3$  (d.1.12) at room temperature for 60 hrs. respectively, then precipitated as  $BaSO_4$ . Organic sulfur in coal and cokes was calculated by subtracting inorganic sulfur content from total sulfur. The obtained results are given in Fig. 1.

**Results.** In the stepwise carbonisation experiments of Kishu-anthracite, the remaining sulfur content in cokes decreased to constant value at 800°C. in the case of heating rate 5°C/min., but, in 3°C/min., decreased suddenly above 700°C

Pyrrhotite sulfur was formed at about 600°C, and increased above 700°C Sulfate sulfur decreased till 800°C, pyrite sulfur also decreased till 600°C, and, above these temperatures remained constant. On organic sulfur, the maximum was observed at about 600°C.

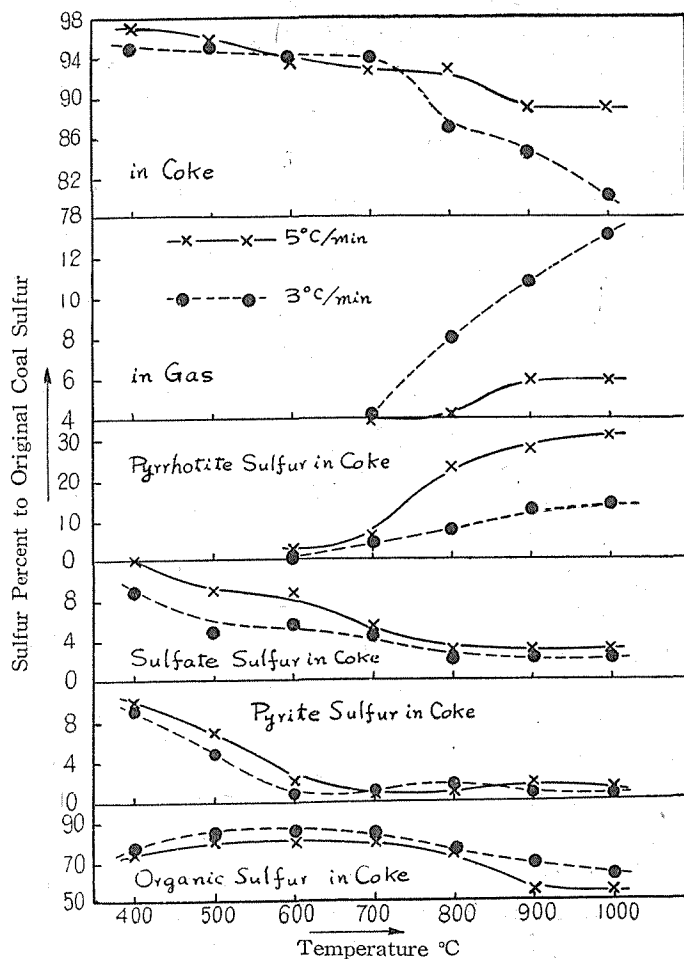


Fig. 1. Sulfur in distilled products.